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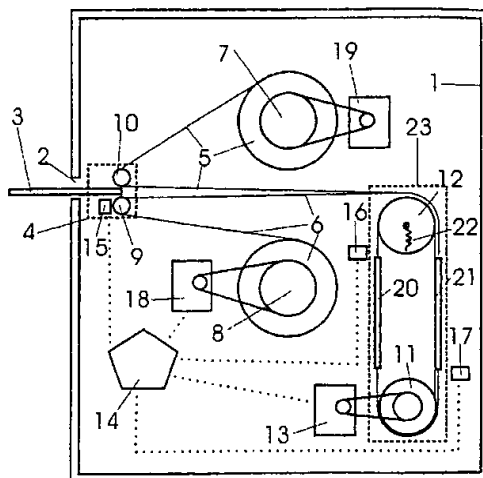
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ance Notes on Codes and Abbreviations" appearing at the begin-  
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(54) Title: **DEVICE AND METHOD FOR STORING VALUE DOCUMENTS**



(57) Abstract: The invention relates to an arrangement for the storage of value documents such as banknotes and a machine for value documents, such as a cash machine. In particular, the invention relates to arrangements in which value documents are stored between thin films. The storage arrangement comprises a transport arrangement with two transport films (5, 6), a drive arrangement (13, 18, 19) for driving the transport arrangement, and a control arrangement (14, 15, 16, 17) for controlling the operation, whereby the transport arrangement is arranged to receive, in a value document exchange region (4), value documents between the transport films during deposition, and to deliver the value documents during dispensing, and to transport the value documents between the value document exchange region (4) and a storage location (23). The transport films are terminated at the storage location by an endless loop that surrounds two storage rollers (11, 12) in order to form a plane storage location for the banknotes.

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## Device and method for storing value documents

**Description****Technical Area**

The invention relates to an arrangement for the storage of value documents, such as banknotes, to a machine for value documents such as a cash dispenser, and to a method  
5 for the storage of value documents. In particular, the invention relates to arrangements in which value documents are stored between thin films.

Such arrangements are used at, for example, supermarket checkouts, in shops, in banks and at post offices, where money is both deposited and dispensed.

**Background and the Prior Art**

10 Several different types of arrangement exist for the storage of banknotes, such as cash dispensers, cash deposit machines and cash machines for depositing, dispensing and the storage of banknotes. These normally comprise a cover with an opening for the depositing and dispensing of banknotes, a transport arrangement for the transport of banknotes between the opening and a storage space, and a control arrangement that  
15 controls the transport arrangement.

Some form of identification and check of the authenticity of the banknotes is often included in cash machines. One example of an authenticity control arrangement is revealed in the patent document GB, A, 2122743.

A special form of arrangement receives deposited banknotes between thin plastic  
20 films and stores these by the process of the plastic films and the interspersed banknotes being rolled up around a roller. The American patent US, A, 4,249,552 reveals an automatic banknote handling arrangement in which (see Figure 4) transparent transport pathways (134, 138) receive banknotes that are rolled up around a storage roller (128).

A similar arrangement is shown in Figure 1, which is an attempt to illustrate the prior  
25 art in a manner that is useful for understanding the present invention. It comprises a cover 101 with an opening 102 for the deposition and dispensing of banknotes 103. A transport arrangement 105, 106, 107, 108, 109, 110, 111 comprising two transport films 105, 106, on transport film rollers 107, 108, which transport films pass over feed rollers 109, 110 at the opening and onwards to a storage space 112 on a cylindrical storage roller 111. The storage  
30 roller is driven by a motor 113 that is controlled by a control arrangement comprising a control unit 114 and a sensor 115 at the opening. The motor 113 drives the storage roller 111 during deposition of banknotes such that the transport films with the banknotes are rolled up onto the storage roller. During dispensing of banknotes, the two transport film rollers are driven instead by the motors 118, 119.

35 The storage roller with stored banknotes occupies a relatively large space if the diameter of the storage roller is large. If the diameter of the storage rollers is reduced, the stored banknotes acquire a curvature.

### Summary of the Invention

The present invention has as its aim an arrangement for the storage of value documents, such as banknotes, a machine for value documents, such as a cash machine, and a method for the storage of value documents, such as banknotes, that achieves an efficient storage of value documents without the disadvantages of the prior art.

The present invention for this purpose specifies an arrangement for the storage of value documents comprising a transport arrangement, comprising a first transport film that passes from a first transport film roller and a second transport film that passes from a second transport film roller, a drive arrangement for driving the transport arrangement, and a control arrangement for control of the driving arrangement, whereby the transport arrangement is arranged to receive, in a value document exchange region, value documents between the transport films during deposition, and to deliver the value documents during dispensing, and to transport the value documents between the value document exchange region and a storage location. The transport films in the arrangement terminate at the storage location with an endless loop that surrounds two storage rollers in order to form a plane storage space for the value documents.

The transport films are constituted by transparent plastic in one embodiment of the storage arrangement according to the present invention.

At least one of the transport films forms the endless loop at the storage location in one embodiment of the storage arrangement according to the present invention.

The transport films are in connection with a pathway that constitutes the endless loop at the storage location in another embodiment of the storage arrangement according to the present invention.

In a further embodiment, the storage rollers comprise rubber material arranged on the surface of the rollers that faces the endless loop.

The first transport film passes, in a further embodiment, from the first transport film roller over a feed roller arranged at the value document exchange region to the storage rollers, and the second transport film passes from the second transport film roller over a second feed roller at the value document exchange region to the storage rollers.

The control arrangement comprises in a further embodiment sensors and a control unit, which control unit is connected to the driving arrangement.

The sensors in one embodiment are arranged at the value document exchange region.

The sensors are arranged in one embodiment at the storage location.

The storage arrangement is arranged in one embodiment in a casing with an opening for the deposition and dispensing of value documents.

The present invention also specifies a machine for value documents comprising arrangements for the storage of value documents. At least one of the arrangements for the

storage of value documents in the machine for value documents is constituted by an arrangement for the storage of value documents comprising a transport arrangement, comprising a first transport film that passes from a first transport film roller and a second transport film that passes from a second transport film roller, a driving arrangement for  
5 driving the transport arrangement, whereby the transport arrangement is arranged to receive, in a value document exchange region, value documents between the transport films during deposition and to dispense value documents during dispensing, and to transport the value documents between the value document exchange region and a storage location. The transport films are terminated in the arrangement at the storage location with an endless loop  
10 that surrounds two storage rollers in order to form a storage location for the value documents.

Further embodiments of the machine for value documents comprise the respective embodiments of the storage arrangement.

The present invention also specifies a method for the storage of value documents in  
15 a storage arrangement, which storage arrangement comprises a transport arrangement comprising a first transport film that passes from a first transport film roller and a second transport film that passes from a second transport film roller, a driving arrangement for driving the transport arrangement, and a control arrangement for control of the driving arrangement; whereby value documents are received during deposition in a value document  
20 exchange region between transport films and whereby the value documents during dispensing are deposited in the value document exchange region and whereby the value documents are transported between the value document exchange region and a storage location. The method is further characterised in that the value documents are stored flat at the storage location where the transport films are terminated with an endless loop that  
25 surrounds two storage rollers.

### Brief Description of Drawings

Fig. 1 illustrates an arrangement, seen from the side, that corresponds to the prior art.

30 Fig. 2 illustrates a cross-section from the side of one preferred embodiment of an arrangement for the storage of value documents according to the present invention.

Fig. 3 illustrates a cross-section from the side of one preferred embodiment of a machine for value documents according to the present invention provided with arrangements for the storage of value documents.

35 Fig. 4 illustrates one preferred embodiment of a machine for value documents according to the present invention provided with arrangements for the storage of value documents.

Fig. 5 illustrates a second preferred embodiment of a machine for value documents according to the present invention provided with arrangements for the storage of value documents.

#### Description of Preferred Embodiments

5           Fig. 2 shows an arrangement for storing value documents, such as banknotes 3, 20, 21, according to the present invention. The arrangement can be used for storing other types of value document, not only banknotes, such as, for example, value coupons, sales check-tapes, credit notes, cheques and gift tokens.

          The arrangement is arranged in a casing 1, provided with an opening 2 for the  
10   deposition and dispensing of banknotes 3 in a value document exchange region or banknote exchange region 4 (denoted by a dashed line in the drawing). The invention comprises a transport arrangement 5-12 for the receipt of banknotes and for the transport of banknotes to a storage location 23 (denoted by a dashed line in the drawing), whereby the transport arrangement comprises two transport films 5, 6 on transport film rollers 7, 8, which transport  
15   films pass over feed rollers 9, 10 arranged at the banknote exchange region 4 to the opening 2 and onwards to the storage location 23, where the transport films pass around two storage rollers 11, 12. The transport films terminate at the storage location with an endless loop. It should be noted for the sake of clarity that the distance between the films at the feed rollers and the thickness of the banknotes have been exaggerated in order to illustrate the invention  
20   more clearly. The banknote exchange region 4 is defined by the locations of the feed rollers 9, 10, since it is between these feed rollers that the banknotes 3 are received. The storage location is defined by the locations of the storage rollers 11, 12, since the banknotes 20, 21 are stored in an endless loop that extends around the storage rollers. One transport film or both transport films can form the endless loop at the storage rollers, or the transport films can  
25   be attached to an endless loop at the storage location. The endless loop bends around the storage rollers but is straight between the storage rollers, such that the banknotes can be stored flat on the straight sections of the endless loop between the storage rollers.

          The transport arrangement is driven by a driving arrangement comprising motors 13, 18, 19, which are controlled by a control arrangement, comprising a control unit 14 and  
30   sensors 15, 16, 17. One sensor 15 is arranged at the banknote exchange region 4 at the feed rollers 8, 9 close to the opening 2. The two other sensors 16, 17 are arranged at the storage location 23. The control unit is connected to the sensors 15, 16, 17 and to the motors 13, 18, 19, as is illustrated with dotted lines in the drawing. The driving arrangement comprises a first motor 13 that drives one of the storage rollers, the first storage roller 11.  
35   The second storage roller 12 is mounted with suspension and keeps the endless loop under tension, something that is illustrated by a spring 22 in the drawing. The driving arrangement also comprises a second motor 18 and a third motor 19 that each drive a transport roller 7, 8.

When banknotes are deposited, the sensor 15 at the banknote exchange region 4 records the presence of a banknote 3 and the control unit 14 causes the first motor 13 to drive the first storage roller 11. The banknote 3 is received in the banknote exchange region between the transport films 5, 6 and is transported to the storage location 23 where the banknote 20, 21 is stored. The sensors 16, 17 at the storage location register or record the positions of the stored banknotes 20, 21, and in this manner the control unit 14 stops the motor 13 at a suitable position.

When banknotes are dispensed, the control unit 14 controls the second motor 18 and the third motor 19, which drive the transport film rollers 7, 8, and in this way the transport films 5, 6 are rolled up around the respective transport film roller, and the banknote 3 is transported to the banknote exchange region 4 where the banknote is dispensed in the opening 2. The sensors 16, 17 at the storage location record the positions of the stored banknotes 20, 21 and the sensor 15 at the banknote exchange region 4 records banknotes that are dispensed, and in this way the control unit can stop the motors 18, 19, and thus the transport films 5, 6, at a suitable position.

It is appropriate that the transport films 5, 6 are transparent or at least semi-transparent and made from a plastic material. The transport film rollers 7, 8 and the storage rollers 11, 12 can be provided with a rubber layer, of natural rubber, artificial rubber, or similar, against which the transport films make contact.

The control unit may use, as an alternative to sensors at the storage location, a timer for controlling the time during which the storage rollers are driven.

**Figs. 4 and 5** illustrate machines for value documents such as cash machines equipped with arrangements for the storage of value documents such as, for example, banknotes, according to the present invention. The machines can be used in, for example, supermarket checkouts, where they are connected to the other checkout equipment, such as, for example, cash till, bar code reader, coin machine, computer, etc. Value documents such as value coupons, sales check-tapes, gift tokens and banknotes can be stored in these.

**Fig. 4** illustrates a machine for value documents with a cash machine 30, with an opening 31 for the deposition and dispensing of value documents such as, for example, banknotes, and a receiving plate 32 for the banknotes. Five storage arrangements 33, 34, 35, 36, 37 for five different banknote denominations are arranged in the storage arrangement. Banknotes of different denominations are deposited through the opening 31, sorted according to their denomination and stored in the storage arrangement 33, 34, 35, 36, 37 intended for the denomination. **Fig. 3** illustrates this type of cash machine 30, with three storage arrangements 33, 34, 35, seen in cross-section from the side, where the storage arrangements 33, 34, 35 are arranged vertically. The cash machine is also equipped with a sorting arrangement 38 comprising an arrangement for the determination of the denomination and for authenticity control 39, banknote controller 28 and a control unit 29 to

which are connected the arrangement for determination of denomination and authenticity control 39 and the banknote controller 28. The sorting arrangements for banknotes can be selected to be of different types and only the principle of the sorting arrangement is illustrated in the drawing. The control unit 29 controls in the sorting arrangement 38 the banknote  
5 controllers 28 to guide the deposited banknote to the correct storage arrangement, depending on the determination of denomination carried out in the arrangement for determination of denomination and control of authenticity 39. Thus when a banknote is deposited through the opening 31 it is sorted in the sorting arrangement 38 and transported to a banknote exchange region in the intended storage arrangement 33, 34, 35, where the  
10 banknote is received and transported onwards to the storage location of the storage arrangement.

Fig. 5 illustrates a machine for value documents with a cash machine 40, with openings 46, 47, 48, 49, 50 for different denominations of banknotes. Storage arrangements 41, 42, 43, 43, 45 for banknotes of different denominations are arranged in the cash  
15 machine. Banknotes are received when deposited through one of the openings by the storage arrangements 41-45 in question in a banknote exchange region (4 in Fig. 2) at the opening 46-50 and transported to a storage location (23 in Fig. 2). The machine can comprise arrangements 39 for the control of authenticity.

The machines for value documents according to the present invention comprise also  
20 connections to power supply, such as the electric supply network, and equipment for communication with other units such as, for example, a computer at a checkout. The number of storage arrangements can be adapted for a currency, with, for example, four storage arrangements for the most common denominations and one for uncommon denominations or for other value documents such as cheques and gift tokens.

25 The invention has been described with embodiments in order to explain its principles and application such that others skilled in the arts can execute the invention with suitable modifications within the framework of their skills. The scope of the invention should only be limited by the attached patent claims.

### Claims

1. An arrangement for storing value documents (3) comprising:
  - a transport arrangement comprising a first transport film (5) that passes from a first transport film roller (7) and a second transport film (6) that passes from a second transport film roller (8),
  - a drive arrangement (13, 18, 19) for driving the transport arrangement, and
  - a control arrangement (14, 15, 16, 17) for controlling the driving arrangement,whereby the transport arrangement is arranged to receive, in a value document exchange region (4), value documents between the transport films during deposition, and to deliver the value documents during dispensing, and to transport the value documents between the value document exchange region (4) and a storage location (23),  
c h a r a c t e r i s e d in that the transport films are terminated at the storage location by an endless loop that surrounds two storage rollers (11, 12) in order to form a plane storage location for the value documents.
2. The arrangement according to claim 1, whereby the first transport film (5) passes from the first transport film roller (7) over a feed roller (9) arranged at the value document exchange region (4) to the storage rollers (11, 12), and whereby the second transport film (6) passes from the second transport film roller (8) over a second feed roller (10) at the value document exchange region (4) to the storage rollers (11, 12).
3. The arrangement according to claim 1, whereby at least one of the transport films (5, 6) forms the endless loop at the storage location.
4. The arrangement according to claim 1, whereby the transport films (5, 6) are connected to a pathway that constitutes the endless loop at the storage location.
5. The arrangement according to claim 1, whereby the storage rollers (11, 12) comprise a rubber material arranged on the surface of the rollers that faces the endless loop.
6. The arrangement according to claim 1, whereby the transport films (5, 6) are constituted by transparent plastic.
7. The arrangement according to claim 1, whereby the control arrangement comprises sensors (15, 16, 17) and a control unit (14), connected to the sensors, which control unit is connected to the driving arrangement.
8. The arrangement according to claim 7, whereby one of the sensors (15) is arranged at the value document exchange region (4).
9. The arrangement according to claim 7, whereby one of the sensors (16, 17) is arranged at the storage location (23).
10. The arrangement according to claim 1, whereby the storage arrangement is arranged within a casing (1) with an opening (2) for deposition and dispensing of value documents (3).



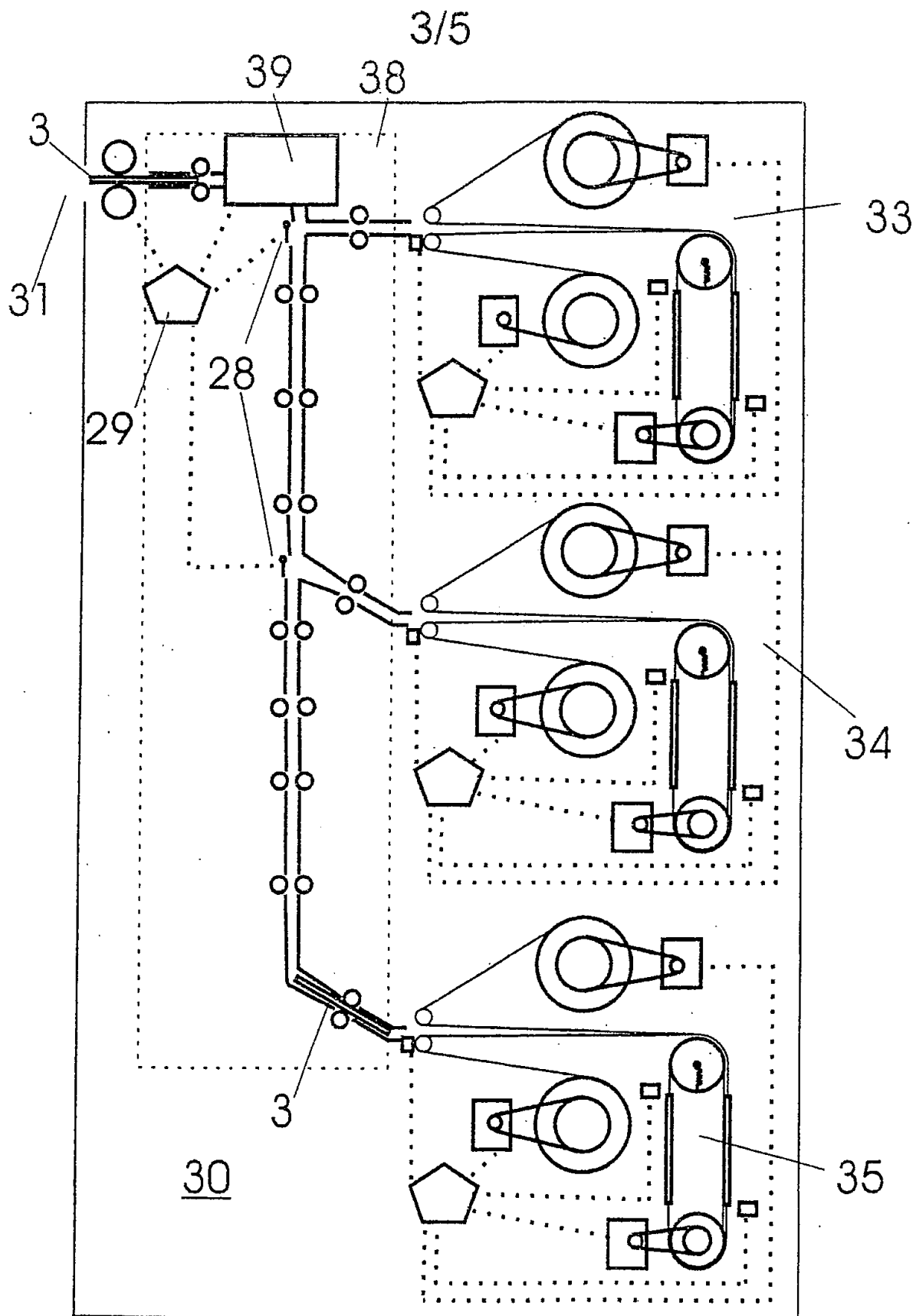
11. A machine for value documents comprising arrangements for the storage of value documents c h a r a c t e r i s e d in that at least one of the arrangements for storage of value documents is constituted by the arrangement according to any one of claims 1-10.

12. An method for the storage of value documents in a storage arrangement, which  
5 storage arrangement comprises a transport arrangement comprising a first transport film (5) that passes from a first transport film roller (7) and a second transport film (6) that passes from a second transport films roller (8), a drive arrangement (13, 18, 19) for driving the transport arrangement, and a control arrangement (14, 15, 16, 17) for controlling the driving arrangement, whereby value documents during deposition are received in a value document  
10 exchange region (4) between the transport films, and whereby the value documents during dispensing are delivered to the value document exchange region and whereby the value documents are transported between the value document exchange region and a storage location (23),

c h a r a c t e r i s e d in that the value documents are stored plane at the storage  
15 location where the transport films are terminated with an endless loop that surrounds two storage rollers (11, 12).







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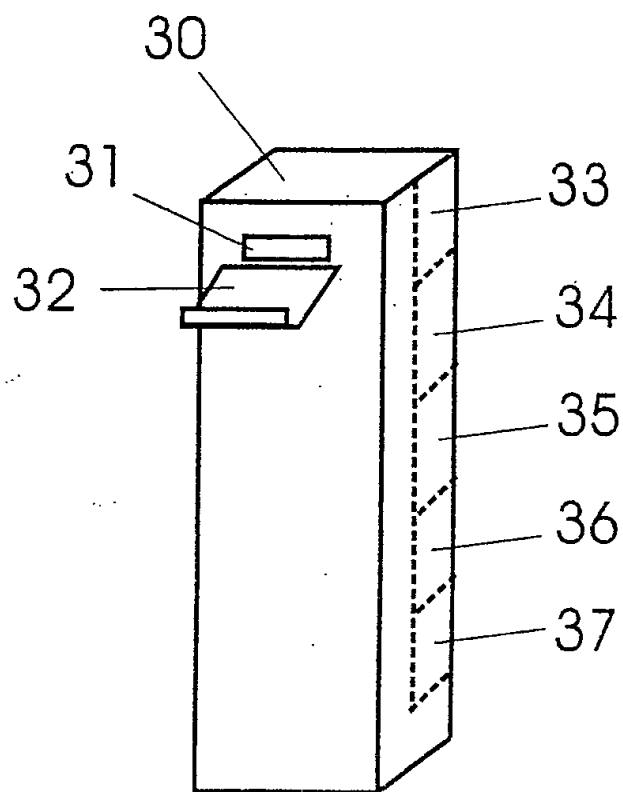


Fig. 4

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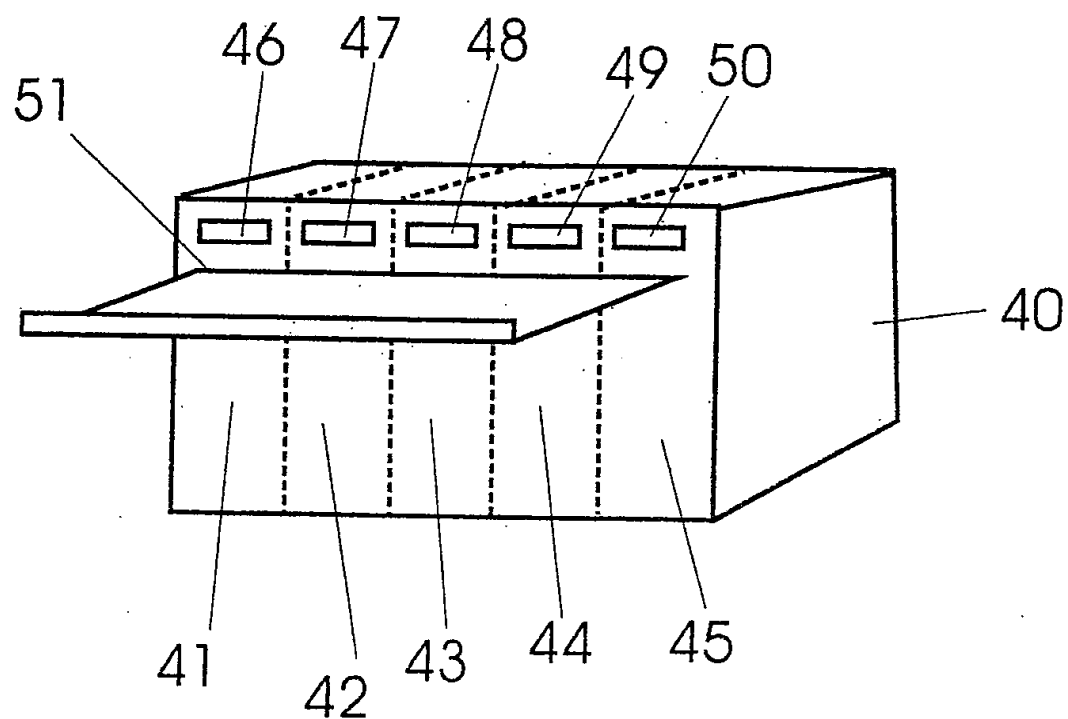


Fig. 5

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2004/000081

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G07D 11/00, B65H 29/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G07D, B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0735513 A1 (DE LA RUE INTER INNOVATION AKTIEBOLAG), 2 October 1996 (02.10.1996), whole document --	1-12
A	DE 2816371 A1 (G.A.O. GESELLSCHAFT FÜR AUTOMATION UND ORGANISATION MBH), 25 October 1979 (25.10.1979), whole document --	1-12
A	GB 2073711 A (DE LA RUE SYSTEMS LIMITED), 21 October 1981 (21.10.1981), whole document --	1-12
A	US 2002003163 A1 (PEEBLES ET AL), 10 January 2002 (10.01.2002), whole document --	1-12

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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